

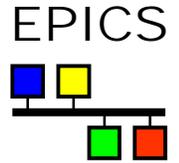
*Transient Recorder Support
EPICS Meeting at ICALEPCS01*

December 2001

Marty Kraimer



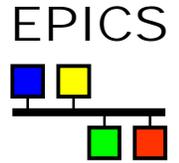
Transient Recorder Support



- ◆ APS/ASD needs high speed TRs. Perhaps many.
- ◆ We already have
 - ◆ Joerger VTR1012, 12 bit, 4 channel 10 megaSample/sec, 512K.
 - ◆ Joerger VTR10010, 10 bit 1 channel 100 megaSample/sec, 256K.
- ◆ We have ordered
 - ◆ Joerger VTR10012_8, 8 channel, 100 megaSample, 1K.
NOTE: VTR10012 has 256K and many more features.
 - ◆ Struck SIS3300, 8 channel, 100 megaSample, 128K.
- ◆ Initial Goal
 - ◆ Be able to test all four recorders.



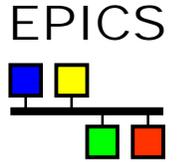
Generic Transient Recorder



- ◆ GTR – Generic Transient Recorder
 - ◆ A GTR is a collection of one or more high speed ADCs all of which are controlled together, share a common gate, trigger, etc.
 - ◆ Provides a generic set of records for control and display.
 - ◆ A generic adl file.
 - ◆ Generic device support.
 - ◆ A generic driver interface for device support or other code.
 - ◆ Support for specific TRs.



Some useful features

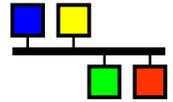


- ◆ After data is collected
 - ◆ Recorder disarmed.
 - ◆ Waveforms read.
 - ◆ Optionally rearm recorder.
- ◆ Types of data
 - ◆ postTrigger
 - ◆ Data collected after trigger.
 - ◆ Single or multiple triggers.
 - ◆ prePostTrigger
 - ◆ When armed recorder collects in circular buffer.
 - ◆ After trigger collect for specified number of samples.



postTrigger

EPICS



gtrControl.adl

rate 30 waveforms autorestart

softTrigger stop start yes

setup enableExtTrigger enableExtGate enableExtClock

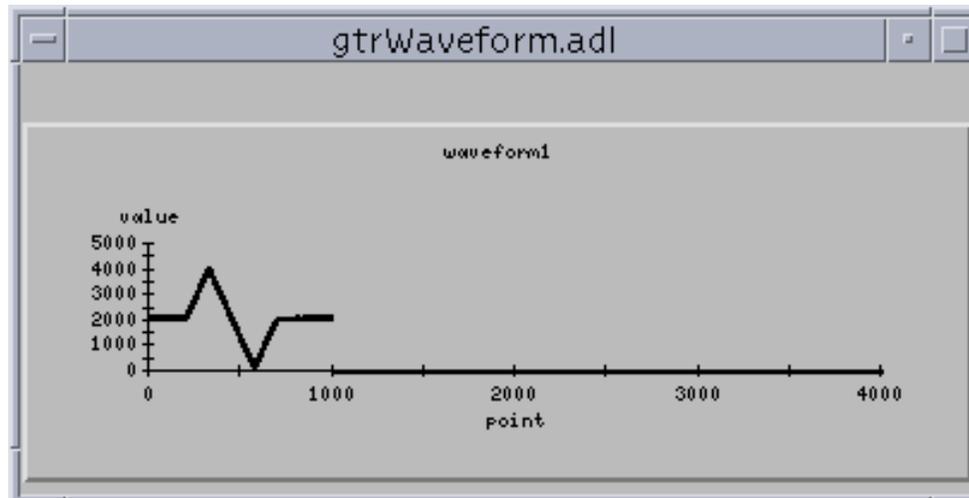
run externalTrigge internalGate internalClock

setClock enablePrePost setSamples

CLK / 1 postTrigger 1000

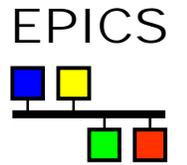
setNumberTriggers

1





postTrigger 4 samples



gtrControl.adl

rate 5 waveforms autorestart

softTrigger stop start yes

setup enableExtTrigger enableExtGate enableExtClock

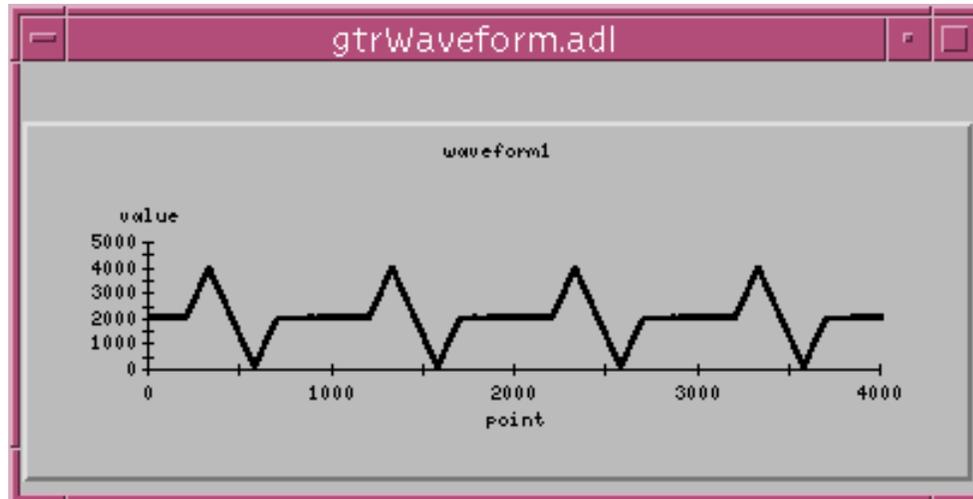
run xternalTrigge internalGate internalClock

setClock enablePrePost setSamples

CLK / 1 postTrigger 1000

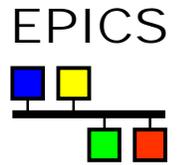
setNumberTriggers

4





prePostTrigger FAILED!!



gtrControl.adl

rate 20

softTrigger stop start

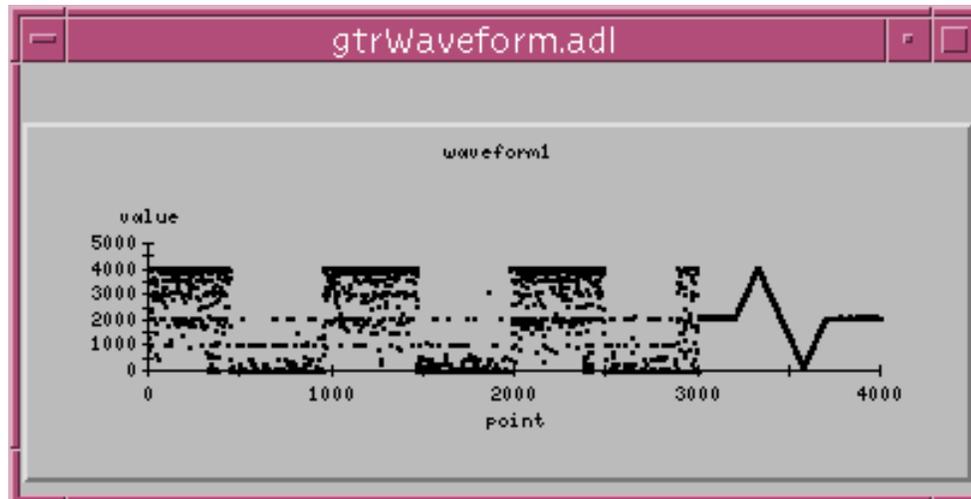
enableExtTrigger enableExtGate enableExtClock

externalTrigger internalGate internalClock

enablePrePost

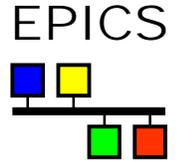
prePostTrigger 1000

setNumberTriggers 1





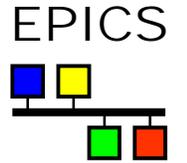
GTR Experience



- ◆ GTR implemented for VTR1012 and VTR10010
 - ◆ Implements most or all features.
 - ◆ Did not get VTR1012 to prePost. Don't know why.
 - ◆ Seemed like good start.
- ◆ Wrote code for VTR10012 and VTR10012_8
 - ◆ Many features of VTR10012 not supported.
 - ◆ No results since we have not received it.
 - ◆ GTR idea still looks good.
- ◆ Started writing code for SIS3300
 - ◆ Many features not supported.
 - ◆ Controls don't match the registers.
 - ◆ GTR not used. Still generic records, adl file.



SIS3300 and GTR Control Screen



sisControl.adl

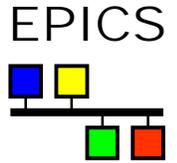
arm	autorestart			
arm bank 1	no	start	stop	reset
setup	multiEvent	pageSize	enableWrap	intControl
setup	noMultiEvent	128K	enable	endEvent
setClock	setMode	multiEvent		
internal	SoftStartStop	noMultiEvent		
stopDelay	startDelay	numberSamples		
0	0	1		
rate 0				
				waveforms

gtrControl.adl

rate 30	waveforms	autorestart	
softTrigger	stop	start	yes
setup	enableExtTrigger	enableExtGate	enableExtClock
run	externalTrigger	internalGate	internalClock
setClock	enablePrePost	setSamples	
CLK / 1	postTrigger	1000	
		setNumberTriggers	
		1	



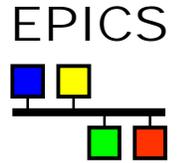
GTR vs. SIS3300



- ◆ GTR created without enough experience.
- ◆ Not sure it is a good idea
 - ◆ SIS3300 control screen is intuitive IF you read SIS documentation.
 - ◆ Essentially all features of SIS3300 are supported.
- ◆ Perhaps try again after more experience.
- ◆ May develop VTR10012 specific support.



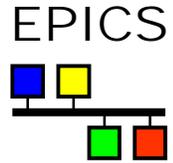
Performance



- ◆ Testing showed that limit was 1 megaSample/sec. Same limit with 68040 and with powerPC. Limit was VME transfers from recorder memory.
- ◆ Why? This is only 2 megaBytes/sec
With a VME bus analyzer we determined that
 - ◆ VTR1012 responded in 190 nanoseconds.
 - ◆ Rest of the overhead was VME interfaces.



Maximum Throughput



- ◆ Guess at why 1 megaSample/sec limit (2 megaBytes/sec)
 - ◆ VME max rate is 40 megaBytes/sec.
 - ◆ No Block Transfer => 20 megaByte limit.
 - ◆ 16 rather than 32 bit transfers => 10 megaByte limit.
 - ◆ VME bus interfaces cause additional factor of 5 performance hit.
- ◆ Solution if needed
 - ◆ VTR10012 and SIS3300 allow 32 bit transfers and Block Transfer.
 - ◆ Perhaps DMA can provide 3 to 5 performance gain
 - ◆ If implemented should try for generic DMA interface.
 - ◆ At this point other limits may happen. For sure on mv167.
- ◆ Limit with VME32 will still be 20 megaSample/sec.